

REMARKS

Claims 1-3 and 5-7 are pending in this application. By this Amendment, claim 4 is canceled without prejudice to or disclaimer of the subject matter recited therein, and claim 5 is amended. No new matter is added.

In the Office Action, claims 1-7 are rejected under 35 U.S.C. §102(b) over U.S. Patent No. 4,003,345 to Bradley. This rejection is respectfully traversed.

Independent claim 4 is canceled and dependent claim 5 amended to be in independent form, including the subject matter of canceled claim 4.

Bradley fails to teach or suggest each and every feature of independent claims 1, 5, or 7. In particular, the Office Action alleges that Bradley teaches an "addition ratio increase means that, when the hydrocarbon fuel is increased, increases the ratio of hydrogen gas addition to the hydrogen fuel." However, this is not supported by the Bradley teachings. Instead, Bradley teaches that once the engine is started using only hydrogen fuel, it adjusts to provide "a desired ratio between the hydrogen fuel and the hydrogen which is delivered to the engine" (col. 5, line 65 to col. 6, line 3). One of ordinary skill in the art would consider this to be a constant "ratio" once the engine has been started and fuel switched from hydrogen only to a mixture of hydrogen and hydrocarbon fuel.

There is no express teaching in Bradley of an increase in the ratio of hydrogen fuel, and clearly no teaching of a fuel property judgment means which bases the increased ratio on a judgment of the property of the hydrocarbon fuel used, such as "when the hydrocarbon fuel is found to be heavy" as recited in independent claim 1. As described in Applicant's specification on page 2, line 11 to page 3, line 8, the property of the hydrocarbon fuel can be judged and used to base a change in the ratio of hydrogen to hydrocarbon to maintain a good combustion even when the property of the hydrocarbon fuel has changed.

Because Bradley fails to teach or suggest each and every feature of independent claim 1, this claim and claims dependent therefrom are not anticipated by Bradley.

Similarly, regarding independent claim 5, Bradley fails to teach or suggest fuel property judgment means for judging the property of hydrocarbon fuel, or an addition ratio decrease means that decreases the ratio of hydrogen gas to a lower-limit value that is derived from the property of the hydrocarbon fuel. Accordingly, independent claim 5 and claim 6 dependent therefrom are not anticipated by Bradley.

Regarding independent claim 7, this claim recites three specific means which are used as indicators of when to increase the ratio of hydrogen gas to the hydrocarbon fuel. None of these specific means are taught or suggested in Bradley. In particular, Bradley fails to teach or suggest (1) "means for acquiring the amount of engine speed decrease immediately after startup"; (2) "an ignition timing feedback correction value prevailing immediately after startup"; or (3) "a hydrocarbon fuel injection amount feedback correction value prevailing immediately after startup." Moreover, Bradley fails to teach or suggest use of such indicators to increase the ratio of hydrogen gas when they are not "smaller than a predetermined value." Accordingly, independent claim 7 is not anticipated by Bradley.

Withdrawal of the rejection is respectfully requested.

In the Office Action, claims 1-7 are rejected under 35 U.S.C. §102(e) over U.S. Patent Application Publication No. 2005/0229872 to Lange. This rejection is respectfully traversed.

Lange is directed to a system for retrofitting an internal combustion engine to use a proportion of hydrogen and fossil fuel. Paragraph [0034] substitutes a proportion of hydrogen at startup, warm-up and low power ranges, with less hydrogen substituted at high loads. Thus, adjustment of the proportion is not based on a property of the hydrocarbon fuel, but specific conditions of the engine. Moreover, paragraph [0060] teaches that the process of calibration of the ratio is "completed only once for a specific type and model of engine in

order to derive the appropriate mapping data characteristics of that engine." This suggests that further adjustments are not necessary.

Lange clearly fails to teach or suggest "fuel property judgment means" as recited in independent claims 1 and 5, or adjustment to the ratio of hydrogen to hydrocarbon fuel based on such fuel property judgment. Accordingly, because Lange fails to teach or suggest each and every feature of these claims and claims dependent therefrom, these claims are not anticipated by Lange.

Regarding claim 7, Lange fails to teach or suggest (1) "means for acquiring the amount of engine speed decrease immediately after startup"; (2) "an ignition timing feedback correction value prevailing immediately after startup"; or (3) "a hydrocarbon fuel injection amount feedback correction value prevailing immediately after startup." Moreover, Lange fails to teach or suggest use of such indicators to increase the ratio of hydrogen gas when they are not "smaller than a predetermined value." Accordingly, independent claim 7 is not anticipated by Lange.

Withdrawal of the rejection is respectfully requested.

In the Office Action, claims 1-7 are rejected under 35 U.S.C. §102(e) over U.S. Patent No. 7,174,861 to Allston et al. This rejection is respectfully traversed.

The Office Action alleges that Allston teaches addition ratio increase/decrease means that decrease/increase the ratio of hydrogen gas to the hydrocarbon fuel "according to the speed of the engine after startup." Applicant disagrees. Allston teaches to optimize a mixture of gasoline and reformate during warming up of an engine to steady-state operating temperature (Abstract). More specifically, Allston teaches to use hydrogen containing fuel "predominately or exclusively either when the engine is cold, as at startup, or when the air-to-fuel ratio sensor 16 detects...above a predetermined acceptance level" (col. 4, lines 60-67).

Allston fails to teach or suggest "fuel property judgment means" as recited in independent claims 1 and 5, or adjustment to the ratio of hydrogen to hydrocarbon fuel based on such fuel property judgment, such as the fuel being heavy. Instead, adjustment is based on the engine cycle (warm-up or steady-state). Accordingly, because Allston fails to teach or suggest each and every feature of these claims and claims dependent therefrom, these claims are not anticipated by Allston.

Regarding claim 7, Allston fails to teach or suggest (1) "means for acquiring the amount of engine speed decrease immediately after startup"; (2) "an ignition timing feedback correction value prevailing immediately after startup"; or (3) "a hydrocarbon fuel injection amount feedback correction value prevailing immediately after startup." Moreover, Allston fails to teach or suggest use of such indicators to increase the ratio of hydrogen gas when they are not "smaller than a predetermined value." Although the ratio in Allston switches after startup once the steady-state temperature is reached, there is no adjustment based on an engine speed decrease immediately after startup. Accordingly, independent claim 7 is not anticipated by Allston. Withdrawal of the rejection is respectfully requested.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-3 and 5-7 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



James A. Oliff
Registration No. 27,075

Stephen P. Catlin
Registration No. 36,101

JAO:SPC/jnm

Date: June 12, 2007

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

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